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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/624,656	07/25/2000	H. Jim Fulford	2000.043500	7729

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EXAMINER	
CHEN, KIN CHAN	
ART UNIT	**PAPER NUMBER**
1765	

DATE MAILED: 05/02/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/624,656	Applicant(s) FULFORD, H. JIM	
	Examiner Kin-Chan Chen	Art Unit 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 March 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19 and 28-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19 and 28-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-19 and 28-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art as evidenced by Choi et al. (US 4,663,191), Holloway et al. (US 4,657,628), Maris et al. (US 5,844,684) and Mifune (US 5,298,278).

The admitted prior art teaches that a layer comprising a refractory metal is formed (page 3 of the specification, line 10). A greatest thickness (so-called a thickness in the instant claims) of the layer of refractory metal is determined (page 4 of the specification, lines 8-9). In addition, in semiconductor device fabrication, because it is a sub-micron high precision process, it would have been obvious to one with ordinary skill in the art to determine the thickness of metal silicide, see Choi et al. (US 4,663,191) and Holloway et al. (US 4,657,628) in the record as evidence. Choi clearly states that the thickness of the metal silicide may be determined by the resistivity of the remaining silicide. It is notoriously well known that by measuring the resistivity, the thickness of the workpiece can be determined (so-called performed by a metrology tool in the instant claims 28-31), see Maris et al. (US 5,844,684) and Mifune (US 5,298,278) in the record

as evidence. The admitted prior also discloses that a portion of the layer of refractory metal is converted to a metal silicide by performing one or more anneal processes (page 3 of the specification, lines 10-14), A duration of an etching process is determined to remove unreacted portions of the refractory metal layer based on the determined thickness of the refractory metal layer (page 4 of the specification, lines 8-10), also see Choi et al. (US 4,663,191) in the record. The etching process may be performed for the determined duration to remove the unreacted portions of the refractory metal layer (the specification, lines 22-23 of page 3, lines 9-10 of page 4). The limitations of claims 1, 8, 9,12, and 17 have been addressed above.

As to dependent claims 2-4 and 13, see the specification, lines 1-10 of page 3.

Claims 5-7, 14-16, and 28-31 differ from the admitted prior art by specifying determine a thickness of the layer of metal based on single measurement or multiple measurements or an average thickness, however, it is simply a simple engineering practice and data collection to measure a thickness of a layer and repeat the measurement as many times as needed for smooth the measurement deviations (e.g., the average and the standard deviation), and indeed, as stated above, in semiconductor device fabrication, because it is a sub-micron high precision process, it would have been obvious to one with ordinary skill in the art to determine the thickness of metal silicide.

As to dependent claims 10,11, 18, and 19, according to the basic engineering principle of annealing /diffusion, the annealing /diffusion process is a function of temperature and thickness of the material, therefore, the unreacted portion of the

material is also a function of temperature and thickness, and a duration to remove unreacted portions of material is accordingly as a function of the temperature and the thickness of the material (so-called correlates the duration of the etching process to the determined thickness of the refractory metal layer in the instant claims). It would be obvious to one skilled in the art to perform data acquisition such as tabulate / extrapolate/ manipulate data and using statistics tools (regression, extrapolation, best-fit) to perform the calculation.

Conclusion

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Choi et al. (US 4,663,191, page 6, lines 6-14)) and Holloway et al. (US 4,657,628, col. 7, lines 50-56) teach determining the thickness of metal silicide. Choi et al. (US 4,663,191, page 6, lines 6-14) also teaches that the duration of an etching process is determined to remove unreacted portions of the refractory metal layer based on the determined thickness of the refractory metal layer. Maris et al. (US 5,844,684; col. 2, lines 44-47) and Mifune (US 5,298,278; col. 5, lines 30-34) disclose that by measuring the resistivity, the thickness of the workpiece can be determined.

Response to Arguments

4. Applicant has argued that the admitted prior art the thickness is based on the assumption or anticipation, not based on measurement. In response, the thickness is still needed to **be determined** either by design rule or by the previous routine experimentation in order to determine the duration of the etching process for removing the unreacted portion of the refractory metal. Claims 1 and 12 do not require determined by the measurement of the thickness. As to dependent claims, as stated in the office action, it would have been obvious to one with ordinary skill in the art to determine the thickness of metal silicide, see Choi et al. (US 4,663,191) and Holloway et al. (US 4,657,628) in the record as evidence. Choi clearly states that the thickness of the metal silicide may be determined by the resistivity of the remaining silicide. It is notoriously well known that by measuring the resistivity, the thickness of the workpiece can be determined (so-called performed by a metrology tool in the instant claims 28-31), see Maris et al. (US 5,844,684) and Mifune (US 5,298,278) in the record as evidence.

5. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kin-Chan Chen whose telephone number is (703) 305-0222. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on (703) 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-2934.

K-C C
April 29, 2003

Patent Examiner
Group Art Unit 1765